AO TRAUMA

Intracapsular fractures of the femoral neck

Per- and intertrochanteric hip fractures

Alan Norrish, Zaid Abual-Rub

Learning outcomes

At the end of this lecture you will be able to:

- Discuss the importance of blood supply for hip fractures
- Explain the importance of positioning, reduction, and perioperative sterility
- Describe the implant choice and the procedure step-by-step
- Suggest how complications can be avoided

AO

At the end of this lecture you will be able to:
- Discuss the importance of blood supply of hip fractures.
- Explain the importance of good positioning, reduction and sterility.
- Describe the implant choice and the procedure step-by-step.
- Suggest how complications can be avoided.

Aim of treatment

– Younger patients (age < 65)

- Anatomic reduction and stable internal fixation
- Preserve femoral head, avoid osteonecrosis, and achieve union
- Ideally avoid arthroplasty
- Maximize potential for return to prefracture mobility

Aim of treatment

– Elderly patients (age > 65)

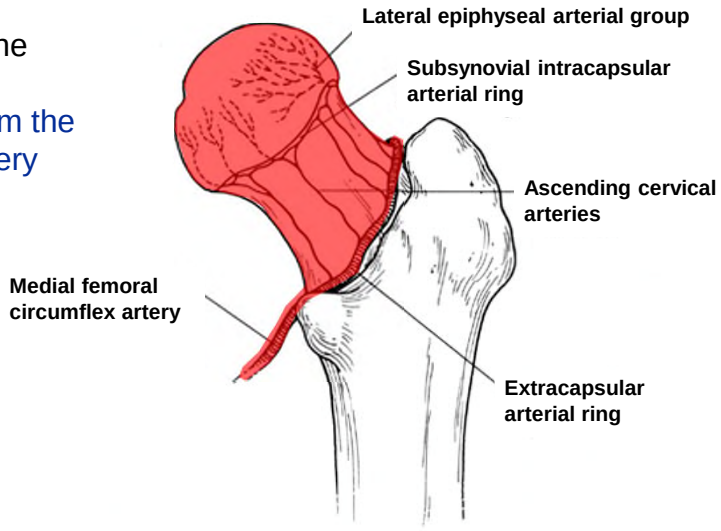
- Allow immediate weight bearing
- Restore prefracture mobility status
- Avoid prolonged bed rest complications

Hip fractures

- High energy (rare)
  - Young patients, polytrauma
- Low energy (very common)
  - 15% of women and 5% of men
  - Osteoporosis most common cause
  - Costs **billions** every year
  - Mortality:
    - 10% at 1 month
    - 30% at 1 year

Blood supply

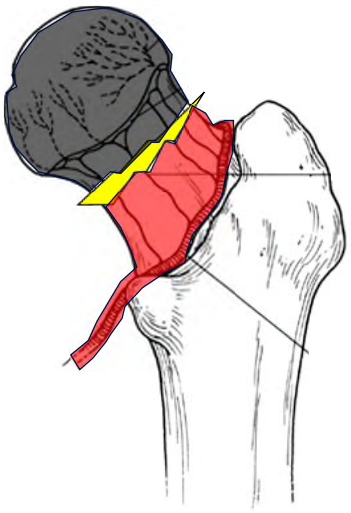
- Blood supply to the femoral head
  - Comes up from the circumflex artery



Review anatomy (see lecture Per- and intertrochanteric fractures)

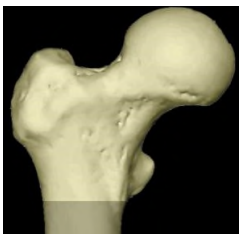
Blood supply

- Transcervical fractures:
  - Blood supply is at risk
  - Necrosis of the femoral head

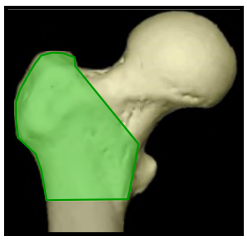


Classification (AO/OTA Fracture and Dislocation)

31-

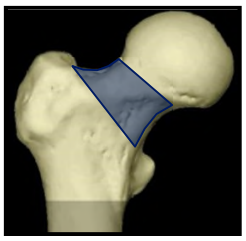


A



Intertrochanteric hip fractures

B



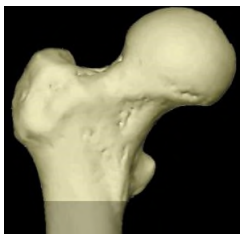
C

Neck and head fractures

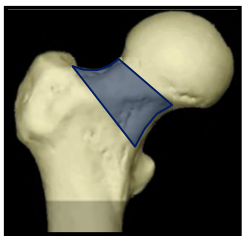
Mainly talk about B fractures.

Classification (AO/OTA Fracture and Dislocation)

31-



B



- This lecture is about the 31-B fractures
- Different 31-B subtypes:
  - Age and physiological status dictate treatment

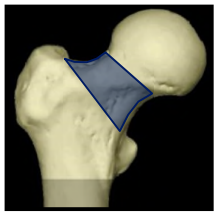
AO

- This lecture is about the 31-B fractures.
- The age and physiological status of patients dictate the treatment.

Classification (AO/OTA Fracture and Dislocation)

31-B

1



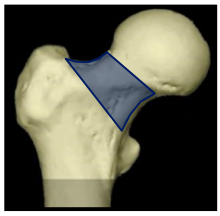
- Subcapital with slight or no displacement
- Stable type
- Non-operative
- Operative: Internal fixation

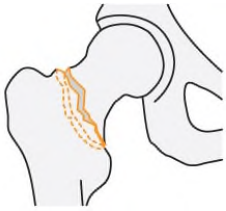
AO

- Nonoperative treatment is indicated in nonambulatory patients or high anaesthetic risk.
- Operative treatment is indicated in young active patients, unwilling to accept risk of fracture displacement.

Classification (AO/OTA Fracture and Dislocation)

31-B 2





- Transcervical with some displacement
- Unstable
- Closed or open reduction
- Dynamic hip screw or
- Cancellous screws
- Arthroplasty

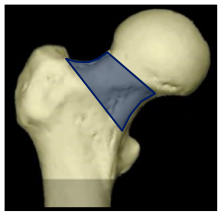
AO

Treatment for transcervical fractures with some displacement are

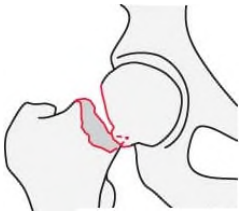
- Closed or open reduction
- DHS
- Cancellous screws
- Arthroplasty

Classification (AO/OTA Fracture and Dislocation)

31-B



3



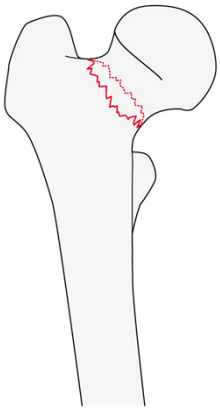
- Subcapital displaced
- Unstable
- Closed or open reduction
- DHS or cannulated screw
- Arthroplasty

AO

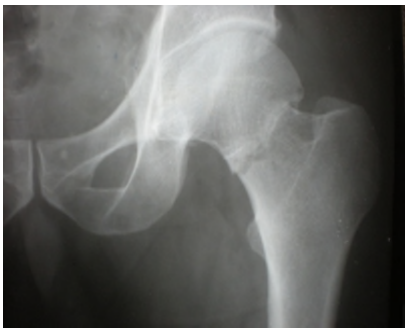
- Good bone quality is required for treatment with cannulated screws.
- Osteoporosis is the indication for the use of a Dynamic Hip Screw (DHS).
- Advanced age and irreducible fractures indicates arthroplasty.

Classification (Garden's)

Type 1

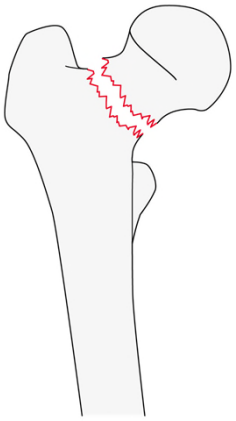


- Undisplaced incomplete, including valgus impacted fractures



Classification (Garden's)

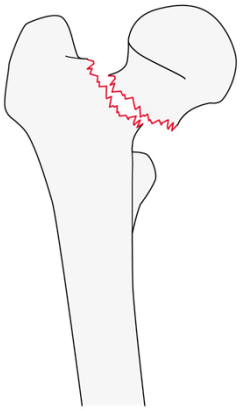
Type 2



- Undisplaced complete

Classification (Garden's)

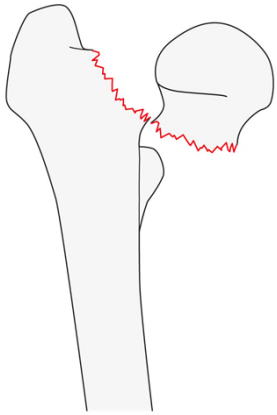
Type 3



- Complete fracture, incompletely displaced

Classification (Garden's)

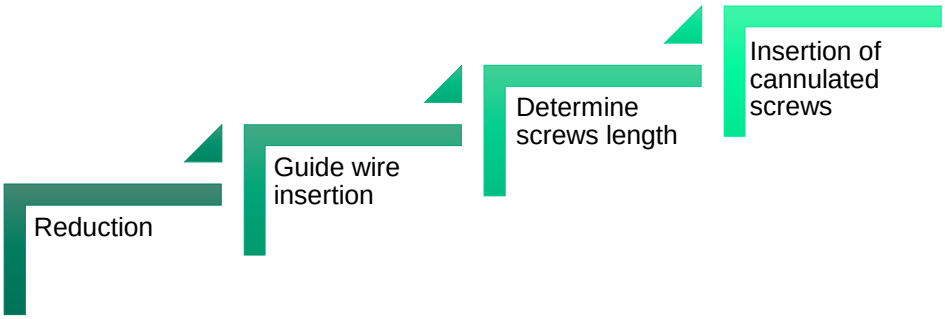
Type 4



- Complete fracture, completely displaced

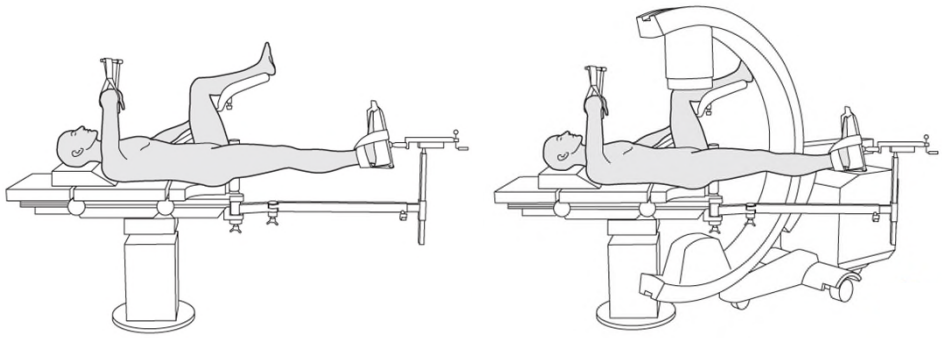
Cannulated cancellous screws

- Technique step-by-step



Technique: Step 1—reduction

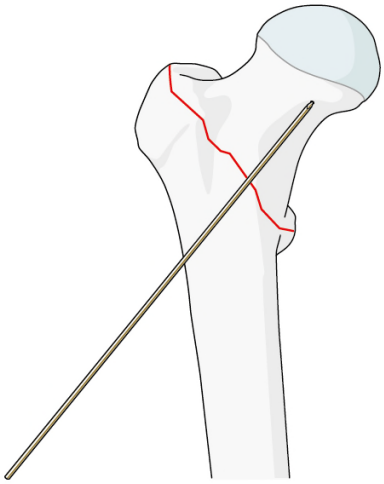
- Use of traction table, closed reduction
- Ensure sterility when draping and using C-arm



In many cases the traction table is used. The reduction is done on this table and before the patient is draped. Important also is to guarantee smooth access of the image intensifier in both planes, AP and lateral.

Technique: Step 2—guide wire insertion

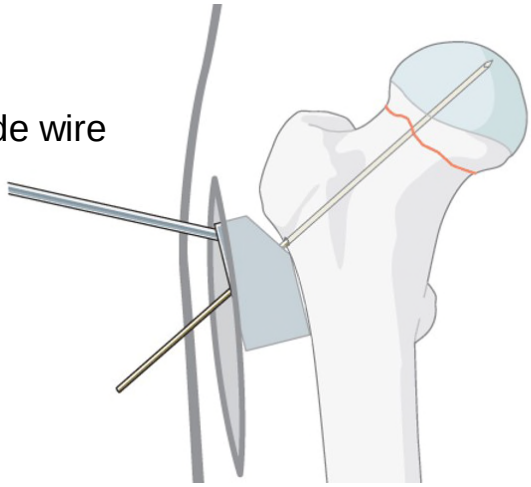
1. Insertion of anteversion wire
   - Use long K-wire



To ensure that the fixation screws come to lie parallel to the neck axis. The anteversion of the femoral neck is determined with a long K-wire inserted with the blunt end first. An alternative is to use a long, non threaded K-wire.

Technique: Step 2—guide wire insertion

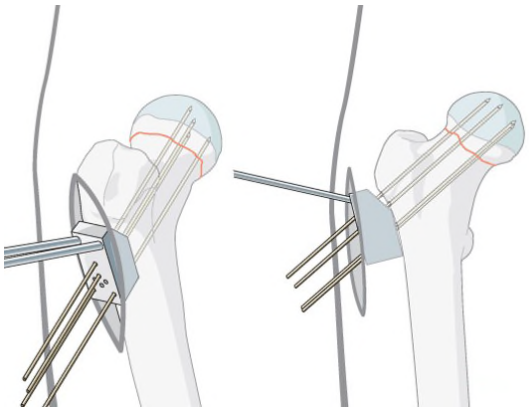
1. Insertion of anteversion wire
   - Use long K-wire
2. Preliminary fixation with guide wire
   - Aiming device
   - Guide wire
   - C-arm



The guide wire is drilled parallel to the anteversion wire through the central hole of the aiming device.

Technique: Step 3—screw length

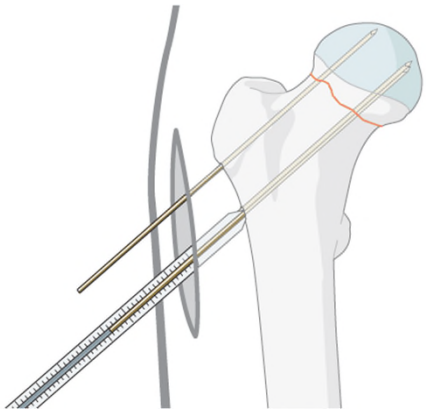
1. Insertion of three guide wires into the head
   - C-arm



1. Position the aiming device so that at least one of the caudal screws will rest on the calcar.
2. Wires should be just short of the subchondral bone.
3. Remove the central guide wire and the aiming device.
4. Check position of wires with the c-arm.

Technique: Step 3—screw length

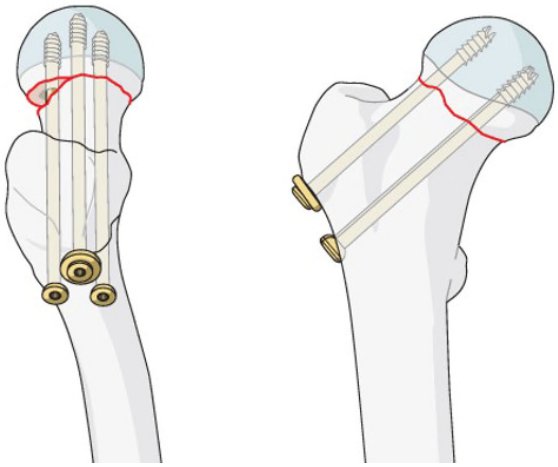
1. Insertion of three guide wires into the head
   - C-arm
2. Measuring screws length
   - Use depth gauge



Choose the length of the drill and screws 5 mm shorter than the length of the guide wires.

Technique: Step 4—screw insertion

1. Drilling
   - 3.6 mm cannulated dri
   - 7.0 or 7.3 mm screws
   - Tap (in dense bone)
   - Washers



1. Drill over the wires with a 3.6 mm cannulated drill bit.
2. Insert three 7.0 mm or 7.3 mm cannulated cancellous screws over the wires.
3. In younger patients with dense cancellous bone, the cannulated tap may be necessary to precut the thread.
4. Use washers to avoid penetration of the screw heads through the thin cortex.

Complications

- Nonunion
- Avascular necrosis

Femoral neck non-union and AVN are the two most significant long-term complications following ORIF.

Factors associated with increased incidence of complications:
1. Increased initial displacement
2. Nonanatomical reduction of fracture

Arthroplasty

- Indications:
  - Displaced intracapsular femoral neck fractures
  - Age > 65
- Total hip replacement or hemiarthroplasty?

Total hip replacement

- Preexisting acetabular disease

- Factors influencing the choice of treatment
  - Patients who were able to walk outdoors with no more than stick
  - Not cognitively impaired
  - Medically fit for anaesthesia and procedure

Questions

Optional:
Insert questions to check learning.

A complication of internal fixation with cannulated screws is

1. Hip dislocation
2. Heterotopic ossification
3. Nonunion

Optional:
Insert questions to check learning.

A complication of internal fixation with cannulated screws is

1. Hip dislocation
2. Heterotopic ossification
3. Nonunion ✓

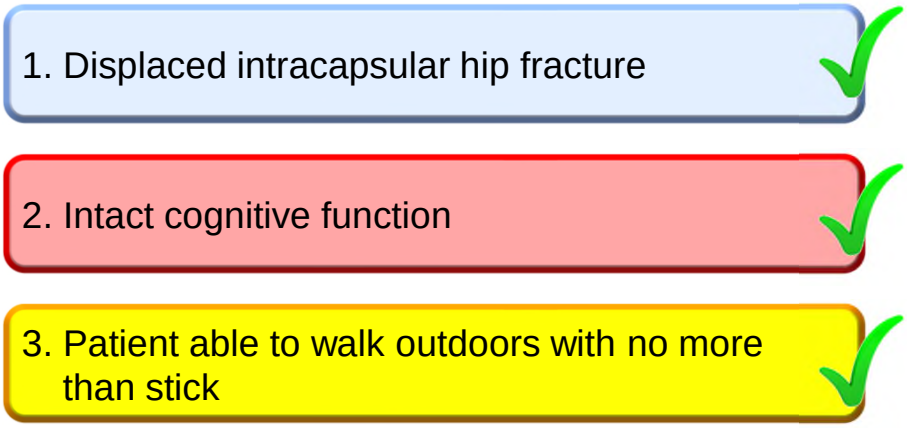
Optional:
Insert questions to check learning.

The indications for total hip replacement

1. Displaced intracapsular hip fracture
2. Intact cognitive function
3. Patient able to walk outdoors with no more than stick

Optional:
Insert questions to check learning.

The indications for total hip replacement



Optional:
Insert questions to check learning.

Which factor is strongly related to nonunion in femoral neck fractures?

1. Age

2. Gender

3. Increased initial displacement of fracture

Optional:
Insert questions to check learning.

Which factor is strongly related to nonunion in femoral neck fractures?

1. Age

2. Gender

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Optional:
Insert questions to check learning.

Take-home messages

- Intracapsular femoral neck fractures
  - Blood supply at risk makes replacement an option in elderly population
- Anatomical reduction is very important in internal fixation
  - Reduces the risk of avascular necrosis and nonunion
- Complete instruments need to be laid out
  - To facilitate a step-by-step approach
- Preoperative planning
  - Reduces complication rate

• For intertrochanteric fractures, good blood supply allows fixation rather than replacement.
• The procedure starts with positioning and a closed reduction (maintain sterile field).
• The right implant must be selected for each fracture type (DHS, PFNA, long PFNA).
• Good instruments can be laid out to facilitate a step-by-step approach to each procedure.
• Preoperative planning reduces complications.